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COUNTRY: Sweden/Netherlands/France/Germany/Switzerland

SUBJECT: Solid State Physics Research in Western Europe

PLACE ACQUIRED: -------

DATE ACQUIRED: Sep thru Nov 52

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SOURCE: US citizen, Ph.D., professor of physics at a well-known US university. In addition to teaching, he is working under contract to the US military establishment in the field of solid state physics. In the fall of 1952 he visited various European research institutes where he compared research in solid state physics and instrumentation techniques with those found in the US.

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Institute of Mechanics, University of Uppsala, Sweden -

1. In the Institute of Mechanics and Theoretical Physics I visited Professor Ivar Waller (probably one of the best physicists in Sweden) and Dr. Per-Olov Löwdin who works primarily on crystal physics especially the calculation of cohesive forces and elastic constants in solids. I talked at some length with both Waller and Löwdin about physical research at various places in Sweden in addition to Uppsala. Professor Waller especially is aware of most everything of this sort that is being done in Sweden. Waller is one of the committee that selects Nobel prize winners, and unfortunately this takes so much of his time that he cannot do anything else; on the other hand he is aware of what almost everyone (of note) is doing.

2. As a result of my inquiry I have found to my surprise no evidence of any work on transistor materials or any extensive experimental work on alkali halides in the universities. Löwdin does much work on the mathematical and theoretical problems in connection with alkali halides and most of his work has been published in a paper covered book entitled "A Theoretical Investigation Into Some Properties of Ionic Crystals". (Uppsala 1948). Interest is not as strong in the fields mentioned as in the United States although Löwdin himself hopes to follow this work and do some theoretical and mathematical work himself. It is claimed that the funds and facilities required to carry on any extensive experimental program in germanium and silicon for transistor work would be too large for Sweden (both in personnel and money). It was claimed that even the telephone company has not begun any appreciable work in the transistor field. The telephone research people seem to be concentrating more on various types of computing mechanics than on solid state physics.

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3. In the Department of Physics at the University of Uppsala I talked with various members of the department engaged in Xray spectroscopy and electron diffraction work. I did not have an opportunity to talk with the nuclear physics group. Professor A. E. Sandstrom showed me around the research laboratories of the physics department. The main effort appears (outside the nuclear physics group) to be directed toward Xray spectrometry. Studies of structure near the short wave length limit of the continuous Xray spectrum. A relatively new large bent crystal vacuum spectrograph has been built under Sandstrom's direction. Spectrographs of this type are built for the purpose of obtaining high resolving power and for working with small intensities. The spectrograph at Uppsala was designed for use in high vacuum because the long wave length region is the most interesting for solid state physics. This spectrograph is described in Arkiv für Fysik Band 4 #36 1952.

4. Electron diffraction equipment has been built using Geiger-Müller counters so that photographic recording methods could be avoided. The purpose of this work is to measure the atomic factor for electrons for different metals; there is apparently disagreement among different experiments using photographic recording and disagreement with the theory of the atomic factor as given separately by Bethe and by Mott. In attempting to use counters in electron diffraction work there are rather strong demands on the stability of various potentials on the diffraction equipment. This work is being done by Sven Lennander and the results are quite good. The apparatus is described in Arkiv für Fysik Band 5 #18 (1952).

5. Dr. Gösta Brogren has been doing some Xray work on rocking curves with very good quartz crystals. The rocking curves are very narrow indicating very high perfection of the material. The best of his quartz came from Steeg & Reuter at Bad Homburg near Frankfurt.

Division of Applied Mathematics, Royal Institute of Technology, Stockholm (Kungl Tekniska Hogskolan - KTH) - 13 Sep 52

6. I spent some time with Professor Lamek Hulthen of the Division of Mathematical Physics at the KTH discussing "scattering problems" especially as connected with work in ultrasonic scattering and absorption investigations in solids. During this conversation I inquired about the interests of the L. M. Ericsson Telephone Company in solid state physics believing that they must surely be interested in transistor work. It may be that the phone company isn't doing anything of this sort (although it sounds incredible). In any case all that I could learn was that the telephone company was mainly concerned with computing machines. Hulthen is or was a consultant to L. M. Ericsson

Philips, Eindhoven, Netherlands - 26 and 27 Sep 52

7. Personnel interviewed:

H. B. G. Casimir — Bienfait

John Smit — H.P.J. Wijn

8. There are about 180 technically trained people at Philips (of scientist level although not necessarily all with doctors' degrees). Philips keeps close liaison with most of the universities especially Leiden and Amsterdam. Casimir is a special professor at Leiden as well as Director of the research laboratories at Philips. Casimir has been asked to take the position left vacant at Leiden by the death of H. A. Kramers; he has not at this time, October 1, 1952, accepted or refused - Casimir's present job at Philips is probably equally attractive in many ways and undoubtedly pays more than Leiden could pay. Casimir is, in my opinion, certainly the best theoretical physicist in Holland since the death of Kramers. He has, moreover, rather wide practical experience.

9. Philips is becoming active in experimental work on plant and biological problems. There are facilities for studying the growth of plants in fluorescent light - there are plant and animal houses.

10. Philips is considerably more research minded and research conscious than comparable United States firms with the exception of Bell Laboratories where the attitude is about the same.

11. Some work on Germanium is underway not only at Philips but also at Leiden (for low temperature behavior) with Philips Germanium. Some high pressure work on germanium is reported under the University of Amsterdam (van der Waals laboratory). I did not inquire any further when I learned that Philips has only very recently found out, from Bell Laboratories, how to make pure germanium - this seemed to show, at that time at least, that there could not be very much to be learned from Philips on the question of germanium.

12. Ferroxcube and Ferroxdure. Feroxcube, the older material, has high electrical resistivity and high magnetic permeability which places Ferroxcube in the category of magnetically soft materials. The Ferroxdure materials are magnetically hard, that is, they can be permanently magnetized. Whereas most permanent magnet materials contain nickel or cobalt, Ferroxdure does not. Ferroxdure has the composition.

$$BaO\ 6\ Fe_2O_3 \qquad \overset{III}{BaFe_{12}}\ O_{19}$$ Hexagonal - Magnetoplumbite

the hexagonal axis is the easy direction of magnetiziation.

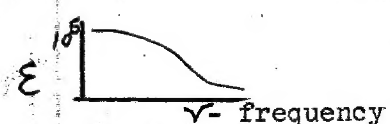
13. Most of the important technical features of Ferroxdure are described in a recent article (January 1952) in Philips Technical Review under the title:

"Ferroxdure, A class of New Permanent Magnet Materials" by Went, Rothenau, E. W. Gorter and Oosterhout.

14. Soft materials such as Ferroxcube produce losses in a high frequency field but hard materials such as ferroxdure offer new technical possibilities because of the very high electrical resistivity. The high resistivity allows Ferroxdure to be used in high frequency applications. One such possibility mentioned to me at Philips is that of using a rod of Ferroxdure transvensely in a rectangular guide for changing the impedance magnetically for modulation, variable coupling, switching, impedance matching and so on. Applications combining the use of Ferroxdure with Ferroxcube are obvious.

15. I have obtained from Philips come samples of Ferroxdure and some specially oriented Alnico V (needle structure 1000 A° by 100°) material for examination in our laboratory by means of ultrasonic attenuation methods and for magnetic measurements. The results of this work should be very interesting technically and should lead to further interchange of information.

16. Some information about r.f. losses and dielectric constant as a function of frequency were discussed. (These are not in the published material).



17. Other questions concerning ferromagnetic materials were discussed particularly details in connection with Alnico V or Triconal [which originated at Philips].

Concerning Alnico V:

$(BH)_{max}$ obtained before cooling in presence of magnetic field is about 2×10^6.

$(BH)_{max}$ after cooling in presence of field from 850° to 800° (then annealing at 600°) is about 5×10^6.

$(BH)_{max}$ obtained by using (in addition to the magnetic field) a temperature gradient along the 100 direction favorable to the long needles (i.e. in direction of long needles) is about 8×10^6.

The values of $(BH)_{max}$ are obtained with H along the long axis of the needles. The needles (about 1000A° by 100A°) are cobalt rich while the region just outside the needles is cobalt poor.

Kipp Instrument Company, Delft, Holland

18. A visit to the Kipp Instrument Company in Delft, Holland was made for two reasons - first this company is one of the very best manufacturers of specialized research instruments and secondly, I wanted to find out specifically about infrared equipment and if possible where it is sold.

19. The range of instruments manufactured here is very large including a variety of galvanometers and associated accessories including recording equipment, thermo-relays and thermo-couple magnifiers, vacuum thermo-couple equipment for radiation measurements, thermopiles, solar radiation equipment, photo-electric colorimeters, spectrophotometers recording and non-recording, monochromators 2400 to 160000 A^{o}, photo cell equipment such as amplifiers etc., recording microphotometers. Medical equipment for measurement of oxygen saturation of the blood (haemoreflector) and a device for continuous observation and measurement of the arterial oxygen saturation on the patient during functional tests of the heart and lungs, etc. All of the equipment is hand made and of the very best workmanship. The person with whom I talked at Delft was Dr. W. Reichert who apparently does much of the design of new equipment. A complete catalog of this equipment is in my files and others are easily obtained. One interesting feature of this company is the strong effort to keep up with all of the latest ideas in instruments. Dr. W. Reichert is in constant touch with people who want special equipment of new design, and he is constantly engaged in designing new instruments.

University of Amsterdam - 29 and 30 Sep 52

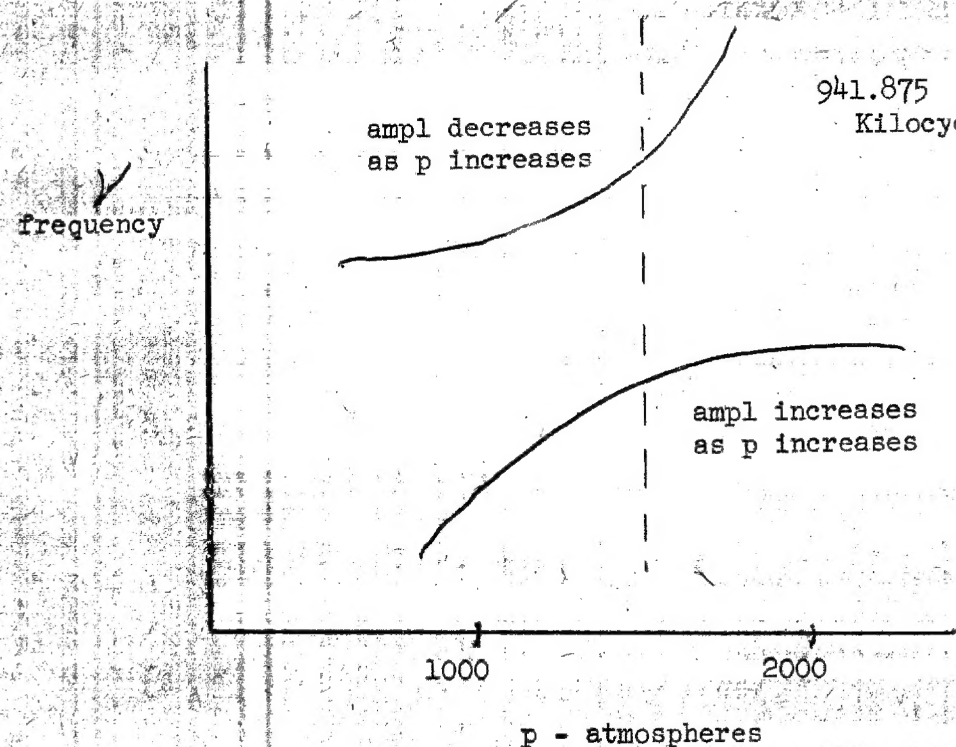
20. Conversation mainly with Dr. Jan C. Strijland and Peter van Meurs (graduate student working for doctor's degree). The work which I saw at the Van der Waals Laboratory was, as is well known, concerned almost entirely with the physical properties of materials under high pressures. The Laboratory concentrates on the precision measurement of high pressures up to about 3,000 atmospheres rather than on work at very high pressures.

21. The measurement of some phenomena at low temperature and at high pressure is also done here.

22. Measurement of the conductivity of Germanium and the change in conductivity with pressure has been carried out varying both temperature and pressure. The change in pressure was from 0 to 3000 atmospheres and in temperature 0 to 100^{o} C. The germanium in question was not particularly pure. Originally the resistivity was 3 ohm cm.; it was produced by Philips at Eindhoven. The result of [illegible].

23. The effect of pressure on the Curie point temperature of Barium Titanate has been investigated rather thoroughly.

24. The shift in the reasonance of an oscillating quartz crystal under high pressure has shown rather remarkable behavior. The fundamental frequency was 940 KC /a Link-Radio Transmitter crystal serial #27833̲7. The results were roughly as shown:



Further work using ultrasonic methods is underway.

25. In metals and metal alloys such as CuNi the measurement of the shift in temperature of the Curie point has been made. The measurement of the velocity and the dispersion of velocity in gases (for example CO_2) at high pressure has been carried out.

26. The methods and techniques of high pressure work are under constant study at the Van der Waals Laboratory. A part of the shop facilities of the laboratory is concerned with making high pressure equipment for sale. The laboratory is concerned with other high pressure work in addition to that mentioned here but most of this has been published. A. Michels, the director of the laboratory was at the University of Maryland when I was in Amsterdam; Michels is helping as a consultant to set up a high pressure laboratory in the US.

Compagnie Generale de Telegraphie Sans Fils - 31 Oct. 52

27. With M. Villard I next visited Dr. Nguyen Thien-Chi who is directing work on semi-conductors mainly for thermistors. A considerable amount of effort appears to be put into thermistor work. This work is done in what is called Laboratoire de Chemie General et Metallurgie Department de Recherches Physico-Chemiques. A considerable amount of work has gone into the study of sintered powder mixtures such as MgO, Si O_2, Fr O_2 on one hand, with Ni, Co, Fe, Mo, W, and graphite on the other hand. Oxides such as ZnO, TiO_2, Ta_2O_5, and V_2O_5 have been extensively investigated as well as Ti_3O_5. The work, however, is mainly on the temperature behavior of the resistivity of these materials. Some of the thermistors are used up to 1100°C. Some special alloys are also under development by this group. There is no evidence of germanium work on transistors and no work on high μ materials.

27a. The Ceramics Laboratory is concerned chiefly with ceramics for condensers. The work on the development of ceramics and condensers is really excellebt. A catalog of these condensers is available.

28. Altogether I was much more impressed by the work that the tube group is doing than with anything else at C.S.F.

The First Physical Institute at Göttingen - Nov 11-15 1952.

Personnel Interviewed:

Prof. R. W. Pohl	Dr. Glover
Heinz Pick	Dr. Barth
Werner Martienssen	

29. At Göttingen there are three physical institutes called First, Second and Third Institutes, under the direction of Pohl, Kopfermann, and Meyer respectively. The Second Institute under Kopferman is concerned with Nuclear and Atomic Physics and now concerned mainly with mass spectroscopy and the measurement of nuclear moments. The Third Institute under Meyer is concerned with what is called technical physics, in particular with electroacoustics, room acoustics, loudspeakers, but apparently not working in ultrasonics. In addition to the two institutes mentioned and to the First Institute (about which I will write in some detail) there is the Institute für Theoretische Physik under the direction of R. Becker. Becker is no longer interested in ferromagnetism; he is spending his time on problems in physical statistics.

30. The First Institute, formerly under R. W. Pohl (now retired), was at the time I visited it without a new director, although Pohl was still acting as director until a new one could be obtained. Both R. Hilsch and E. Mollwo of Erlangen had been mentioned as likely successors to Pohl.

31. Work at the First Institute is entirely connected with studies of the alkali halide single crystals. Many aspects of the preparation of single crystals are studied as well as optical absorption and conductivity of these crystals. The measurement of optical absorption in connection with color centers in the alkali halides is one of the principal concerns of the First Institute.

32. The study of optical absorption and electrical conductivity is carried on as a function of:

    (a) crystal preparation
    (b) treatment with vapor produced color centers
    (c) Xray induced color centers
    (d) lattice parameter changes with temperature

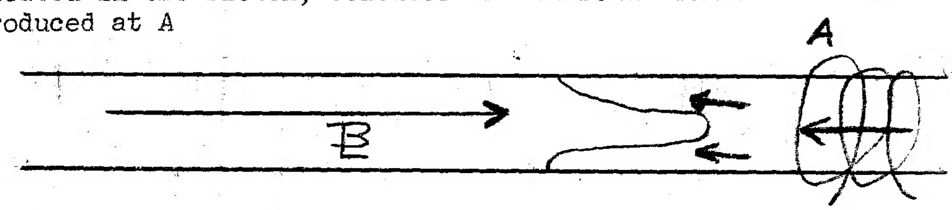
33, The published work of this institute is very large; the program on alkali halides has continued under Pohl for many years. At the present time the main research workers are Dr. Heinz Pick, Dr. Werner Martienssen, Dr. Glover, and Dr. Barth. Dr. Glover is, however, from the United States and will return here soon. Dr. H. Pick expects to visit at the University of Illinois from about April to September of this year. [1953]

34. I have always been impressed with the people and the work from Göttingen and visiting the university here has only strengthened my convictions that if I had my choice of places to work as a physicist in Europe it would be Göttingen. The Federal Technical Institute at Zurich would be the only serious competitor.

Institut für Theoretische Physik der Institut Liebig-Hochschule, Giessen - 16 Nov 52

35. I talked with Dr. Döring at his home; he pointed out that very little of the experimental work which he wants to see done has gotten underway so that there is not very much to see in his laboratory. Dr. Döring left Göttingen about two years ago so that he has been in Giessen only that length of time. Dr. Döring used to work with Dr. R. Becker in Göttingen; They wrote a well known treatise on Ferromagnetism.

36. One very interesting question now under investigation by Döring is that of the speed of propagation of a domain wall in a ferromagnetic wire. Consider a wire magnetized to saturation in one direction, and imagine that at on end of the wire there is a coil or winding which can be used to introduce suddenly a current which will reverse the magnetization in the part of the wire in or near the coil. With the wire magnetized as indicated in the sketch, consider the introduction of a reverse magnetization introduced at A



The boundary between the part of the wire magnetized in the original direction and the part of the wire now magnetized in the opposite direction is

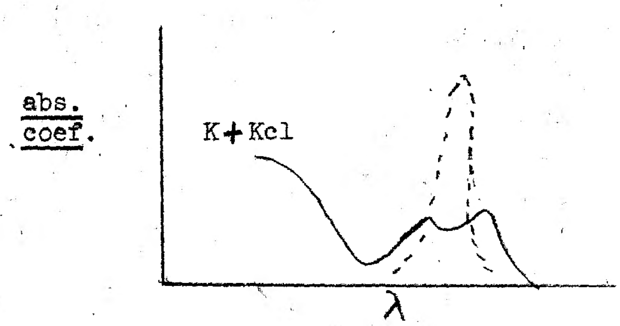
not planar but is somewhat as shown. The velocity with which this front moves from right to left has been determined approximately as 200 meters/second.

37. Further conversation with Döring was concerned with magnetic after-effect in iron and the question of the higher density of C and N_2 atoms in the domain walls. Carbon atoms in iron can move rather easily and the magnetostriction can cause C atoms to move forward and to lodge in the lattice at domain walls especially when a cubic lattice can stretch into a tetragonal lattice. The question of interest in this connection is whether a similar situation prevails in nickel because if so this may explain certain peculiar behavior we have observed in our work in our laboratory (in connection with attenuation measurements).

The Physical Institute of The University of Erlangen - 19 Nov 52

38. Professor R. Hilsch was a student of R. Pohl of Göttingen. Since the retirement of Pohl at Göttingen a new head of the First Institute is being sought. I know that Professor Hilsch was asked to take this job. At this time /February 1953/ I do not know whether he has accepted or not.

39. We discussed at some length the question of defects in solids and the variation in the behavior of solids that can be produced by introducing and removing such defects. Hilsch and some of his people are studying the preparation of thin films of alkali halides with high concentration of color centers or defects /as many as 5×10^{18} defects/cc (a concentration of 10^{-4})/ by evaporation onto quartz at 90°K the materials potassium and potassium chloride (K + Kcl) evaporated together. Apparently many defects can be obtained in the thin films with this manner of preparation. It can be shown that these color centers or defects or holes without electrons are decreased in number when prepared at low temperature and then taken to higher temperatures. For example with a thin film of K + KCl evaporated on a quartz surface at 20°K and held at that temperature one gets an abnormal optical absorption curve somewhat as indicated (solid) then when the layer is heated to room temperature and measured one gets the usual absorption curve indicated by the broken curve.

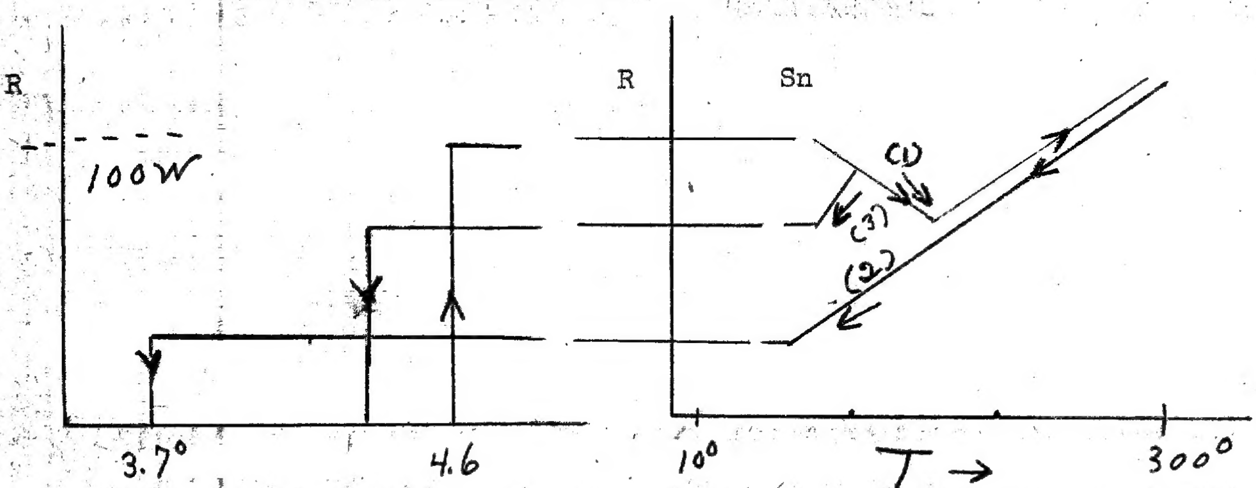


40. The conclusion is that many more defects can be kept in this and similar materials prepared and held at low temperatures than when they are allowed to come to room temperature. The importance of "defects" in such effects as absorption and conductivity is certainly illustrated.

41. Many other aspects of the behavior of solids at low temperature, especially in the alkali halides, are being studied.

42. Layers of Ag Cl + Ag and Ag Br + Ag have been studied in a way similar to KCl + K. Super conductivity of metals such as tin and zinc are being studied in a number of ways. One type of experiment is that of using a layer of Sn on quartz. The tin usually becomes superconducting at 3.7°K and there isn't much that affects this situation. One thing that can be done is to produce the Sn layer by evaporation at low temperature (about 10°K) then the resistance behaves as follows with tin temperature:

Superconductivity of Tin



43. When the sample of tin is prepared at about 10°K the resistance is initially high. As the temperature is allowed to increase from 10°, R drops as shown along path (1) to a minimum at about 200°K and then increases with temperature. If taken to room temperature the path is approximately as indicated in curve (1). On returning to low temperature from room temperature the path of R is as shown in (2). R is now very much lower at 10°K than it was before going to higher temperature. An intermediate situation is shown in (3). The temperature at which the material becomes superconducting is different depending on whether the film has been kept at 10°K in which case the transition temperature for superconductivity is 4.6° or whether allowed to go to 300°K in which case the

transition temperature for superconductivity is 3.7°K. There are intermediate transition temperatures between 3.7° and 4.6° depending on how high in temperature the sample has been allowed to go. The question of defects in solid state physics is the main issue. The work at Erlangen is in general concerned with the comparison of the concentrations of defects produced at low temperatures with the concentrations usually produced at higher temperatures. The results show that larger concentrations of defects can be obtained in a solid if produced and held at low temperatures. The work at Erlangen is of the highest caliber comparable in every way with the work at Pohl's Institute in Göttingen or with that at the Federal Institute in Zurich. The lecture room and its equipment were shown very proudly by Hilsch who follows the Göttingen tradition of giving the best in elementary lectures and demonstrations.

44. Since my visit in mid-November, 1952, a report from the London Office of Naval Research has appeared. The title is "Solid State Physics at Erlangen, Germany" - Technical Report ONRL 9-53 dated February 2, 1953.

The Institute of Applied Physics, University of Erlangen.

45. I did not talk with Professor Erich Mollwo, but the concern of this group is primarily that of the electrical properties of metallic oxides especially Zinc Oxide. Such properties as photoconductivity and electrical conductivity changes under electron bombardment are being studied. Large zinc oxide crystals are grown from the vapor phases of zinc and oxygen.

Siemens Schuckertwerke, Erlangen - 20 Nov 52

Personnel Interviewed:

Professor W. Finkelnburg, Head of the Gas Discharge Tube Group.
Dr. H. Welker, Head of the Solid State Group.

46. Welker and his group have developed compounds of Indium-Antimony with properties which appear to make it very much superior to Germanium for some transistor purposes. Since my visit to Siemens-Schuckertwerke in November, 1952, the work described has appeared in Zeitschriff für Naturforschung, Band 7a, Heft 11, 1952, under the title "Uber neue halbleitende Verbindungen" by H. Welker. They also investigated other possible semiconductor compounds of Indium. With Indium-Phosphrous they experienced contact rectification troubles. Indium-Arsenic looked better than Germanium but was worse than Indium-Antimony. Other comparative mobility data obtained by Siemens Erlangen are:

Mobility -cm²/volt sec.

	Electron Mobility	Hole Mobility
Germanium	3600	1700
Grey Tin	3000	
Diamond	900	
Silicon	1200	

47. Welker says he figured out that In Sb should have an advantage from chemical bond considerations and comparisons with materials where the semi-conductor behavior is known. Welker has published the article mentioned in paragraph 46.

48. The appearance of a small piece of In-Sb shown to me was that of a very shiny (polished) hard metal. The new semi-conductor materials promise to be at least as important as Germanium and Silicon for use as transistors. One must be careful, however, about undue optimism until further work has been done. The mobility considerations are not the only ones involved. If only mobility were to be considered these new materials might be expected to be useful at much higher frequencies than with Germanium. This may or may not actually be the case. I did not find out what Siemens has done about making and using transistors.

<u>University of Munich, Germany</u> - 21 Nov 52

Personnel Interviewed:

Walter <u>Gerlach</u>
F. <u>Franberger</u>

49. This group under Gerlach is concerned mainly with ferromagnetism and with certain anomalous behavior of ferromagnetic materials.

50. Fraunberger has been studying the high frequency resistance of Nickel and other ferromagnetic materials as a function of temperature above about 350°C and up to 550°C. Certain peculiarities in the resistance-temperature curve are the subject of present investigation. Some discussion of this work is given in Zeitschrift für Naturforschung Band 5a, Heft 3, 1950 and in Zeitschrift für Physik Band 132 seit 212-220 (1952). One of the principal interests of Gerlach and his associates is the effect of impurities on the properties of materials especially the magnetic properties. Another aspect of this same interest is that of the effect of gases on the magnetic properties of ferromagnetic materials.

Swiss Federal Institute of Technology (Eidgenossische Technische Hochschule-ETH) - 24-26 Nov 52

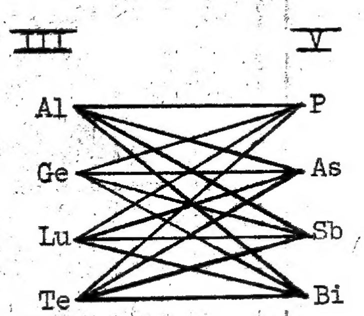
Personnel Interviewed:

Professor Paul Scherrer	Dr. Känzig
" Georg Busch	Dr. Gränichler

47. I talked at some length with Känzig and Gränichler about piezoelectric and and ferroelectric studies and in particular about Barium Titanate. Känzig has published much of his work* under the title "Röntgenuntersuchen über de Seignetteelectrizität von Barium Titanat" which is an x-ray study of the transition of the untwinned ferroelectric Ba TiO_3 crystals from the cube phase into the tetragonal phase as a function of temperature. Other work is now being done on size effects in ferroelectric domains. There seems to be a critical domain size below which ferroelectric behavior is altered. "Critical Domain Size in Ferroelectrics" by W. Känzig and M. Peter Phys. Review 85 #5940-941 . Also "Wall Energy of Ferroelectric Domains" by W. Känzig, Phys. Review, 87 #2, 388.

48. F. Lona has measured by ultrasonic-optical methods the elastic constants of transparent piezoelectric and ferroelectric crystals over a range of temperatures from -50° C to +30°C. Crystals of KD_2PO_4 Rb H_2PO_4 and NaCl O_3 were used to measure the elastic constants. This work is described in Helvetica Physica Acta 23. # 6/7 1950. A later paper by F. Lona and P. Scherrer is concerned with the measurement of the five elastic constants of ice at -16°C. Helvetica Physica Acta 25. #1/2 1952.

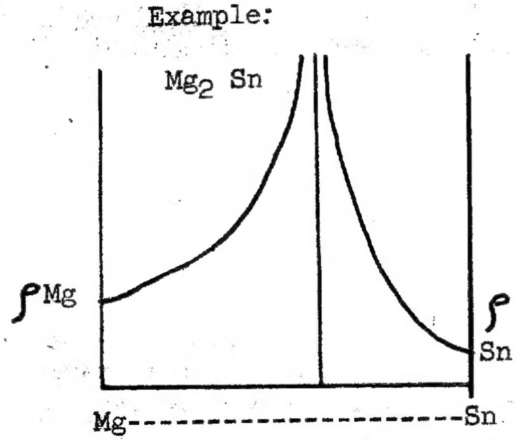
49. The work of Georg Busch and his co-workers on Grey Tin and other semi-conducting materials is I believe of strong importance. I found that Busch was aware of the semi-conductor behavior of the various compounds such as the Indium-Antimony one mentioned under Erlangen and the Siemens Schuckertwerke. I do not believe that Busch knew of the rather high electron and hole mobility as measured at Erlangen. In any case Busch pointed out that very many more semi-conductors can be realized. In particular we talked about such systems as indicated here.



Mg_2 — Si, Ge, Sn, Pb

Mg_3 Sb_2
Mg_3 Bi_2
Sb Cd
Sb Sn
Bi Cd
Sb Sn
Bi Sn

Example:



*Helvetica Physica Acta 24. #2 1951

50. I could not be sure whether Busch had done (or was doing) any work on these materials. He is very actively investigating Grey Tin, and some parts of his work are confidential. The applications of the semi-conductor work to infrared devices I am sure is one of the classified parts of the work. From conversations I am led to believe that there may be some ways of using grey tin in practical devices or perhaps they have learned how to get grey tin in solid form rather than powder. These last remarks are speculation on my part. In any case the work on grey tin is continuing as an academic matter. This is done partly at least because like silicon, germanium and diamond grey tin has the diamond structure. There may be a modification of lead with a diamond lattice. An excellent review of the "Electronic Properties of Grey Tin" is given by Busch, Wieland, and Zoller in "Semi-Conducting Materials (1951). Another paper on "Magnetic Susceptibility of Grey Tin" by Busch and Mooser is to be found in "Zeits für Physikalische Chemie" 198 1/4(1951).

51. I was impressed with the facilities both for teaching and research at the Physical Institute. The lecture room and its facilities which Professor Scherrer uses for elementary lectures would put to shame anything that I know of in this country.

52. At the time when I visited Zurich a representative from the Battelle Institute in Geneva, Mr. Robert Keagy, was also visiting the institute to establish contact with Professor Scherrer and to invite Scherrer to become acquainted with the work which Battelle had planned in Geneva.

-end-